**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
**NATIONAL OCEAN SERVICE**

**Office or Response and Restoration**
**Silver Spring, Maryland 20910**

# CRUISE REPORT[1]

**VESSEL:** NOAA Ship *Hi'ialakai*

**CRUISE:** HI-05-08

**PERIOD:** October 11-31, 2005

**AREA OF OPERATION:** Northwestern Hawaiian Islands, Maro Reef (Fig. 1)

**TYPE OF OF OPERATON:** Personnel working for Joint Institute for Marine and Atmospheric Research (JIMAR) and the Coral Reef Ecosystem Division, Pacific Islands Fisheries Science Center, National Marine Fisheries Service (NMFS), NOAA, and from the Hawaii Mapping Research Group (HMRG) of the University of Hawaii conducted multibeam mapping at Maro Reef and at a seamount between Nihoa and Ni'ihau Islands. In addition, one Coral Reef Early Warning System (CREWS) buoy was replaced at Maro Reef and gear and supplies were transferred at French Frigate Shoals (FFS).

**ITINERARY:**

11 October — Start of cruise. Embarked Joyce Miller, Jonathan Weiss, Emily Lundblad, Jeremey Jones, Joe Chojnacki (JIMAR/CRED), Jamie Smith (JIMAR/HMRG), June Firing (UH/CRED) and Frances Lichowski (UH volunteer). Departed Aloha Tower at 0900. Held a ship introduction at 1000, science meeting at 1300, and safety drill at 1430.

12 October — Transited to FFS.

13 October — Arrived FFS at 0700 to rendezvous with personnel from Marine Debris program. Objective was to transfer boats and gear belonging to the PIFSC Protected Species Division (PSD) from

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| | FFS to *Hi'ialakai* and to move food supplies for Marine Debris Program from *Hi'ialakai* to *Freebird*. Transfers were done by Marine Debris personnel working with *Hi'ialakai* personnel using four launches from *Freebird*. PSD gear on-loaded included 2 small boats, 20 buckets, 7 totes, 2 flattened fuel drums, and misc. personal gear; 15 boxes of vegetables and yogurt were transported for Marine Debris. Departed FFS en route to Maro at 1045. |
| 14 October | Arrived Maro Reef at 0730. Deployed conductivity-temperature-depth (CTD) for 2000-m cast; winch level wind broke when cast was brought back up. CTD cast was recovered at 1100. Survey up at SE Maro Reef was started at 1130. Survey on north bank of Maro Reef in 100+-m water depths was conducted. |
| 15 October | Night survey operations were conducted in 100+ m depths. Weather was excellent with 5-10-kn winds and 3-5-ft seas. Deployed 10 m *HI1* launch in order to replace CREWS buoy at 0730. *HI1* first made recon run to CREWS buoy site to assess condition of anchor, then returned to ship to embark divers (Joe Chojnacki – dive master; Jeremey Jones – lead diver; Mark O'Conner – bosun and diver; Ensign Sarah Jones – safety diver; Merlyn Gordon – coxswain) and take new CREWS buoy in tow. Ship was in stand-by mode during dive operations. *HI1* returned to ship at 1600. During CTD cast at 1700, winch again failed. Wire was cut off and CTD winch was nonfunctional for remainder of cruise. CTD was done by hand. Night survey operations were conducted on western bank in 100+-m water depths. |
| 16 October | Assessed weather at 0600 for possible deployment of 25-ft survey launch of R/V *AHI*. Confused seas at 6-10 ft were prevalent from 340 and 140˚ and building; weather was marginal with numerous squalls in vicinity. Decision was made not to deploy *AHI*. Began ship survey of Maro Bank top, with survey lines to the south of the reef at 119/299 degrees azimuth, to minimize impact from swells. |
| 17 October | Deployed R/V *AHI* in 7-10-ft swells at 0730 (L) and recovered at 1630 (L). Ship and *AHI* ran survey south of Maro Reef in 20-100-m water depths. |
| 18 October | No deployment of R/V *AHI*, swells 5-7 ft, winds 15 kn. Continued ship survey south of Maro Reef. |
| 19 October | No deployment of R/V *AHI*, swells 5-7 ft, winds 20-25 kn. Continued ship survey south of Maro Reef. |
| 20 October | No deployment of R/V *AHI*, swells 5-7 ft, winds 25-35 kn. Continued ship survey south of Maro Reef. |

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| 21 October | Deployed R/V *AHI*, swells 5-7 ft, winds 20-25 kn. Recovered *AHI* at 1300 when swells and wind chop increased. Continued ship survey south of Maro Reef in 20-100-m water depths. |
| 22 October | No deployment of R/V *AHI*, swells 7-10 ft, winds 25+ kn. Continued ship survey south of Maro Reef in 20-100-m water depths. At 1300 L the CTD nylon line wrapped itself in the screw. CTD was recovered safely and most of the line was recovered on deck. The CO requested that Jeremey Jones, NOAA/CRED working diver, examine the starboard propeller area to determine if all the line was removed. On three free dives Jeremey removed some remnants of the line, but two wraps were bound so tightly that it was not possible to free them. Operations resumed with no apparent damage to the propellers. |
| 23 October | Deployed R/V *AHI*, swells 5-7 ft, winds 17-22 kn. Recovered *AHI* at 1630 L. Shifted ship survey to west of Maro Reef in 20-100-m water depths. |
| 24 October | Deployed R/V *AHI*, swells 3-5 ft, winds 15-20 kn. Recovered *AHI* at 1630 L. Ship surveyed to southwest of Maro Reef. |
| 25 October | Deployed R/V *AHI*, swells 4-6 ft, winds 18-22 kn. Recovered *AHI* at 1630 L. Ship surveyed to southwest of Maro Reef. |
| 26 October | Deployed R/V *AHI*, swells 1-3 ft, winds 18-20 kn. Recovered *AHI* at 1430 L. Ship surveyed to southwest of Maro Reef. HI1 was launched at 0900 and 1500 for recreational snorkel/dive trips. |
| 27 October | Deployed R/V *AHI*, swells 3-5 ft, winds 20-25 kn. Recovered *AHI* at 1500 L. Survey until 1800 L on East Maro Reef. Began transit to Honolulu. |
| 28 October | In transit. |
| 29 October | In transit. |
| 30 October | 0100 L. Surveyed at seamount between Nihoa and Ni'ihau Islands. 0700L -- Resumed transit to Honolulu. |
| 31 October | Arrived Snug Harbor at 0900. |

**CRUISE STATISTICS:**

| | Maro | Seamount | Totals | Comments |
|---|---|---|---|---|
| CREWS deployed | 1 | 0 | 1 | |
| CREWS recovered | 1 | 0 | 1 | |
| Multibeam coverage, sq. km | 490 | 26 | 516 | *AHI* coverage included |
| *Hi'ialakai:* Multibeam survey days (24 hrs). | 13 | 0.25 | 13.25 | 14 days on site at Maro – 1 day used for other ops and equipment problems |
| *Hi'ialakai:* CTDs | 23 | 1 | 24 | |
| *R/V AHI:* Multibeam survey days (8 hrs). | 7 | 0 | 7 | |
| *R/VAHI:* CTDs | 8 | 0 | 8 | |

**MISSION AND RESULTS:**

A. Conduct benthic habitat mapping of the reefs and submerged banks in the NWHI, with a primary focus on Maro Reef, using ship-based and launch-based multibeam echosounders. Conduct CTDs as needed to provide accurate sound velocity measurements for multibeam mapping operations.

1. Thirteen days of multibeam surveys were conducted on the bank surrounding Maro Reef (Fig. 1). Four hundred ninety sq. km. were surveyed, representing approximately 30% of the estimated 1646 sq. km between 10-100 fm (~18-180 m). On previous cruises, an estimated 267 sq. km had been mapped at Maro Reef; approximately 1000 sq. km between 10-100 fm (60% of area) remain to be mapped. The area surveyed was mainly to the south and west of the Maro Reef complex, focusing on one rectangular area that had been identified as important by PIFSC lobster scientists. See Appendix A for a detailed description of shipboard operations.
2. Survey lines to fill the 50-fm isobath were run on HI0507 and HI0508. Approximately 70% of the 50-fm isobath was completely mapped and 30% was partially mapped. A final line to complete the 50-fm isobath in the NW quadrant of the bank was cancelled because of limited transit time.
3. The R/V *AHI* was deployed on only 7 of a possible 14 survey days as a result of marginal sea and wind conditions during this October mapping cruise. *AHI* coverage is estimated at approximately 45 sq. km. See Appendix B for a detailed discussion of *AHI* operations.
4. Thirty-two CTDs were taken (24 from ship and 8 from *AHI*) to provide the accurate sound velocities required for multibeam mapping. See Appendix C for a detailed description of CTD operations and problems.
5. Out of 21 sea days (actually 20 24-h work days), six days were budgeted for transits (at an assumed 10 kn) and 14 days for scientific operations. Approximately 21 h of the budgeted 14 scientific days were nonoperational time because of 7 h lost to CTD winch problems, 2 h lost to remove line from starboard propeller, and 12 h of unexpected transit time. The ship left the

Maro survey area 18 h earlier than planned (at 10 vs. 8 kn) because of potential overheating problems with a shunt motor; 6 h of this time were recovered by surveying at a seamount site, resulting in only12 h of unbudgeted transit time.

6. Six hours of survey were done on the 100-fm isobath at an unnamed and unmapped seamount between Nihoa and Ni'ihau Islands.
7. All multibeam data collected on HI0508 were processed and incorporated into high resolution grids.

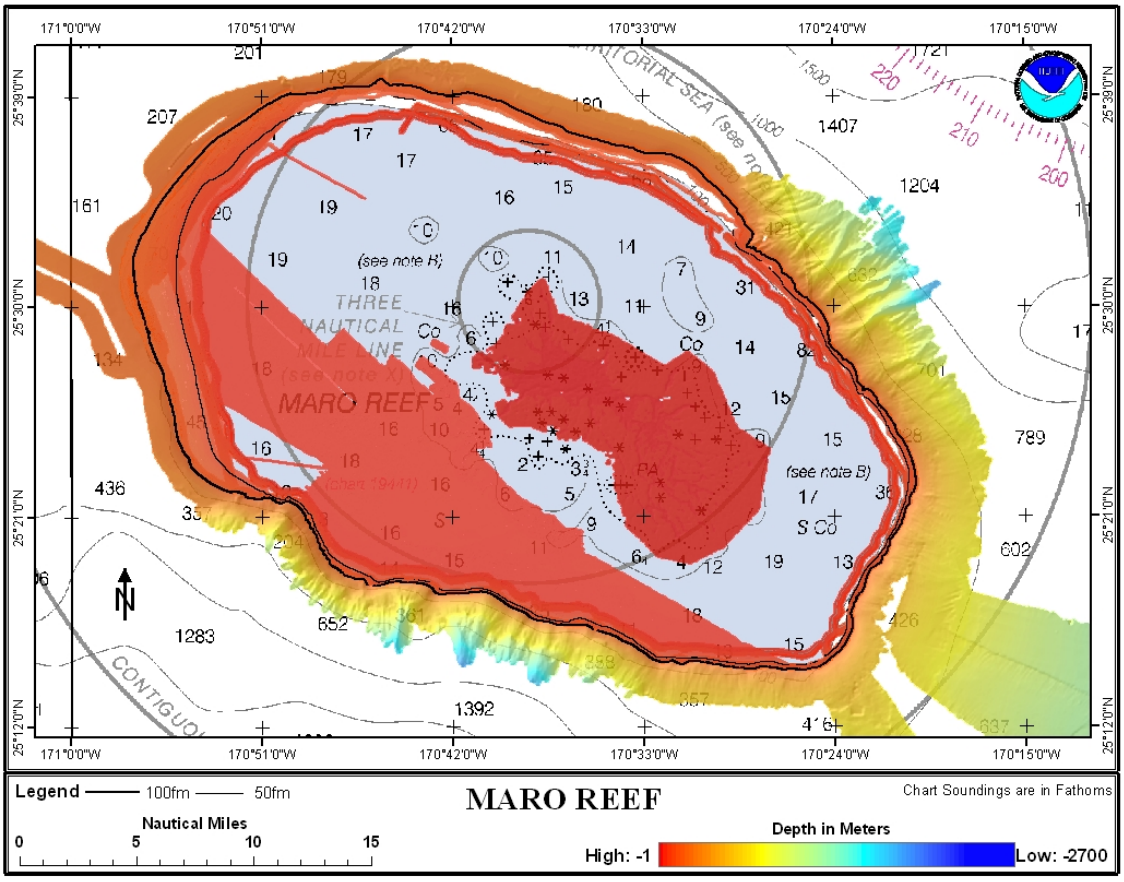


**Figure 1 – Area mapped to date on Maro Reef. 50-fm and 100-fm isobaths are shown.**

8. A significant backlog of multibeam data processing from HI0504, HI0505, and HI0507 was cleared during HI0508. All multibeam data were cleaned and incorporated into high resolution grids. See Appendix D for a detailed description of data processing milestones.
9. ArcMap projects for ten areas in the NWHI were created at the request of the captain in order to provide the ship with information about the location of various boundary isobaths in relationship to shipboard discharge requirements. These projects were set up by CRED staff on a new GIS computer provided for the ship's use -- allowing ship's survey staff to have access to GIS data and projects.

B. Diving Operations with primary mission to deploy a Coral Reef Early Warning System (CREWS) buoy at Maro Reef to allow remote long-term monitoring of oceanographic and environmental conditions affecting NWHI coral reef ecosystems.

1. An existing CREWS buoy (SOSI #280-002; ArgosID 21531) was recovered and a replacement CREWS buoy (SOSI #262-002; ArgosID 26083) was installed on the western end of the shallow central maze at Maro Reef.
2. It was not necessary to deploy a new anchor for the new CREWS buoy and existing settlement plates were left in place on the anchor.
3. Dive operations for deployment of CREWS buoy took approximately 8½ h of science time.
4. Three free dives were done to remove a CTD line that was fouled in the propeller of the *Hi'ialakai*.
5. Two proficiency dives for shipboard personnel were done.

Note: Refer to Appendix E for description of CREWS buoy dive operations.

C. Provide ancillary support for projects at French Frigate Shoals.

1. At the request of the Coral Reef Ecosystem Division's Marine Debris Program, 15 boxes of perishable food stores were delivered to the Marine Debris team at FFS.
2. At the request of the Pacific Islands Fisheries Science Center's Protected Species Division, the *Hi'ialakai* picked up 2 small boats, 20 buckets, and other scientific equipment at FFS. Marine Debris personnel organized and delivered all equipment from Tern Island to the *Hi'ialakai*. This gear was returned to Honolulu aboard *Hi'ialakai*.
3. Approximately 5 h of science time were spent performing the two transfer operations.

**SCIENTIFIC PERSONNEL:**

Joyce Miller, Oceanographer, University of Hawaii (UH)-Joint Institute for Marine and Atmospheric Research (JIMAR), Pacific Islands Fisheries Science Center (PIFSC) –Coral Reef Ecosystems Division (CRED)
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Emily Lundblad, GIS Specialist, UH-JIMAR, PIFSC-CRED
Jamie Smith, Mapping Specialist, UH-JIMAR, Hawaii Mapping Research Group
June Firing, Oceanographer, UH, PIFSC-CRED
Frances Lichowski, Volunteer Geologist, UH
Andrew Rapp, Survey Technician, NOAA Ship *Hi'ialakai*
Jeremy Taylor, Ordinary Seaman, NOAA Ship *Hi'ialakai*

**DATA COLLECTED:**

- High-resolution multibeam bathymetry and acoustic backscatter imagery from ship-based Kongsberg EM300 and EM3002D sonars
- High-resolution multibeam bathymetry and acoustic backscatter imagery from launch-based RESON 8101 sonar
- Acoustic Doppler Current Profiler (ADCP) data
- CTD profiles of varying depths

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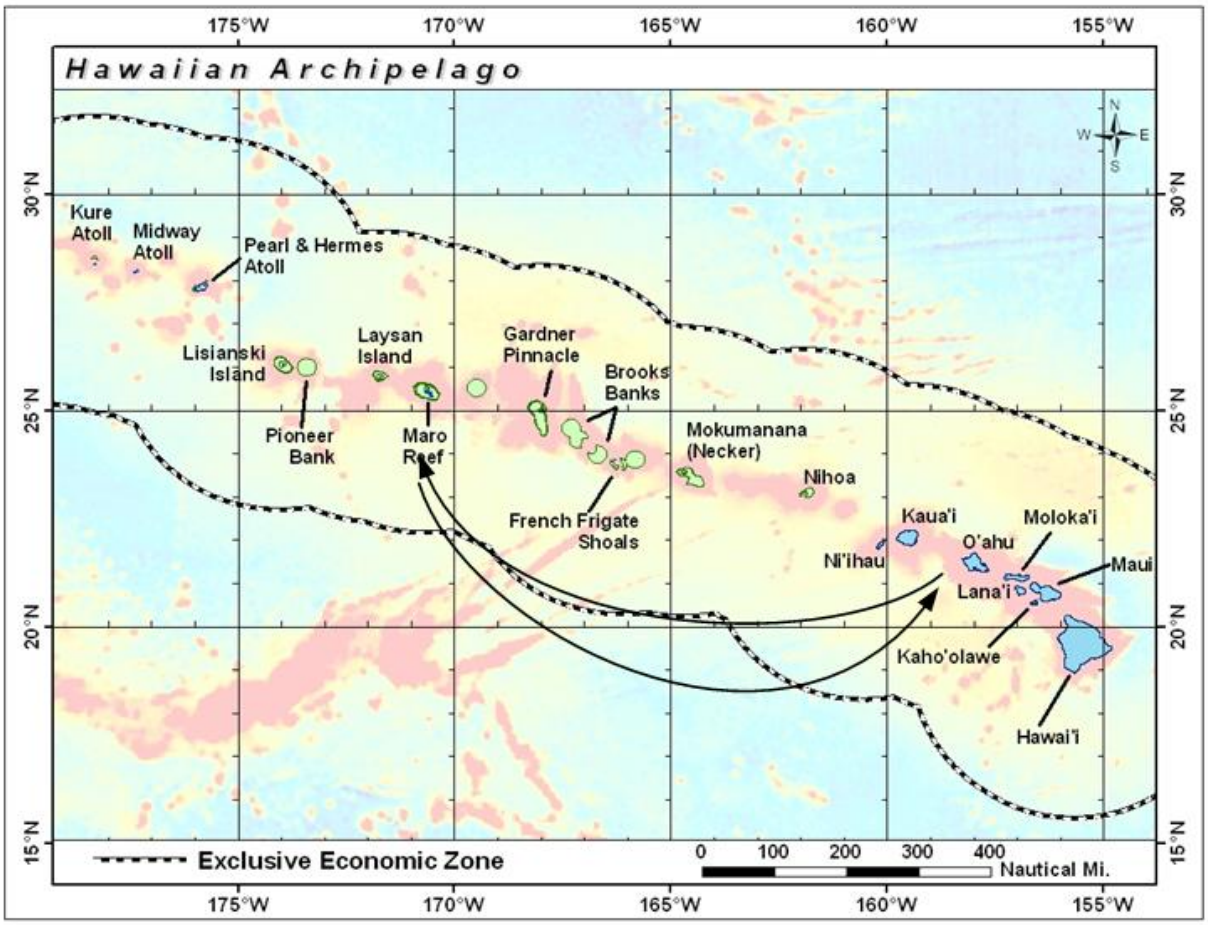


Figure 1. Cruise track of HI-05-08.